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Mainstreaming Community-Based Climate Change Adaptation in Pakistan

Series on Vulnerability and Resilience

Aneel Salman

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LEAD Pakistan

Leadership for Environment and Development (LEAD) is a non-profit organization, working to create and sustain a global network of leaders, who are committed to promote change towards patterns of economic development that are environmentally sustainable and socially equitable. LEAD began as a project of the Rockfeller Foundation in 1992. Its aim was to ensure that sustainable development became integrated in global culture. Today, LEAD International Inc. is a vibrant global organization, with 14 country and regional programs in Asia, Africa, North and South America, and Europe.

LEAD was initiated in Pakistan in 1995 and since then it has evolved into a dynamic organization. Today LEAD Pakistan carries out a range of activities, from Leadership Development, Creating and Nurturing Networks, Poverty Alleviation, Policy and Action Research, all interwoven with dynamics for formation of Social Capital and Public Policy Engagement. It establishes partnerships with organizations having similar mandates of moving the sustainable agenda forward.

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Aneel Salman

About The Author

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About the Series on Vulnerability and Resilience

This research series, as the name suggests, comprises of prime studies that examine the vulnerability to a host of climate induced hazards and also suggests measures to build resilience against them. Each individual study, while conducted in the Pakistani context, reviews the state-of-the-art, both in terms of the ongoing debate around the issue as well as the global best practices. It also reflects LEAD Pakistan's ambition of carrying them out to the highest international standards. To this end, apart from other more traditional measures, a panel of international experts for each of the studies has been put together to review it rigorously.

Abbreviations and Acronyms

ABCs	Atmospheric Brown Clouds
ADB	Asian Development Bank
CBA	Community Based Adaptation
CBNRM	Community-Based Natural Resource Management
CBOs	Community Based Organizations
CITES	Convention on International Trade in Endangered Species (of Wildlife and Fauna)
CLEAR	Climate Leadership for Effective Adaptation and Resilience
DRR	Disaster Risk Reduction
FGD	Focus Group Discussion
FSMP	Forest Management Plans
GDDs	Growing Degree Days
GDP	Gross Domestic Product
GHG	Green House Gas
GKS	Gono Kalyan Sangstha
GLOF	Glacier Lake Outburst Flood
GoP	Government of Pakistan
GSL	Growing Season Length
GUK	Gono Unnayan Kendra
HDI	Human Development Index
HFA	Hyogo Framework for Action

IPCC	Intergovernmental Panel on Climate Change
LAPA	Local Adaptation Plan for Action
MDGs	Millennium Development Goals
MoE	Ministry of Environment
NCCP	National Climate Change Policy
NDMA	National Disaster Management Authority
NDMC	National Disaster Management Commission
NGO	Non-Governmental Organization
NTFP	Non-Timber Forest Product
Pak-EPA	Pakistan Environmental Protection Agency
PCAP	Pakistan Clean Air Program
PES	Payment For Ecosystem Services
PSIR	Pressure-State-Impact-Response
RESOLVE	Regenerative Agriculture and Sustainable Livelihoods for Vulnerable Ecosystems'
SDS	Shariatpur Development Society
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
UO	Unnayan Onneshan
VA	Vulnerability Assessment
VCs	Village Communities
WHO	World Health Organization
WWF	World Wide Fund for Nature

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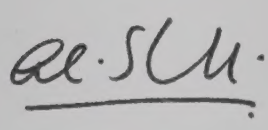
Foreword

This is the second publication in our Occasional Papers ***Series on Vulnerability and Resilience***. Coming on the heels of IPCC's Fifth Assessment Report launched in March 2014, the first update in seven years, it brings to the fore, the issue of community-based adaptation calling for integrating adaptation into Pakistan's existing policies, plans and practices rather than in isolation so that limited resources are used more efficiently. It underlines adaptation as a critical issue and highlights synergies between development and adaptation.

It is high time that the state and citizens declare a 'climate emergency' in Pakistan-a country with such diverse landscape and geography that each region requires specialized 'climate care'. With limited resources and time, while it was not possible to cover the adaptation practices from all agro-ecological zones of the country, we have managed to get case studies from the three most vulnerable ecological zones as cited by the global ***Foresight Report*** (2011) : fragile mountain regions, drylands (semi-arid plains) and low lying coastal areas. Now, more than ever before, state and non-state actors must work side by side to address this challenge, which though global in nature, has deep and wide ranging local impacts. And raising awareness about climate change issues must go hand in hand with collecting relevant information about each sector/level specific climate concerns that need to be addressed; capacity-building and engagement with planners and policy-makers must be enhanced and new 'out of the box' ideas like a few shared in this study must be tested.

This paper offers a 'tailored' CBA framework for Pakistan so that wider uptake and up-scaling of CBA into policy planning becomes possible through an enabling institutional policy environment; respect for traditional knowledge and institutions; the right set of incentives and costs for communities; and last but not least, a cooperative regional environment because no solution is workable without regional cooperation.

However, as stated in the introduction of this Series, the real success of each of these studies would be measured against the level of debate it generates among the policy stakeholders and its ability to impact the relevant policy itself. . Therefore, even at this stage, it's a work in progress, and we would welcome your comments, critique and suggestions for its progression towards the ultimate goal stated above.



Ali T. Sheikh

CEO, LEAD Pakistan

Executive Summary

When it comes to community-based adaptation, three important perspectives are crucial: the stakeholders (or community); the policy (or state) and the challenges and opportunities that lie within its implementation. The community perspective includes their direct experience with climate related risks and how they dealt with it; while the policy perspective focuses on whether planned adaptation efforts should protect a country's GDP or its most vulnerable; and is about prioritizing the most effective interventions, and understanding barriers to adaptation. Unfortunately, the poorest are neither 'visible in economic analyses' nor 'always highest priority in national policy'. This paper highlights that for the most effective climate change adaptation interventions, the community-level is critical for ***autonomous*** adaptation; and that community-level implementation offers effective ***planned*** adaptation. However, the paper also cautions that while community behavior is often a big factor in ***maladaptation***; disjunct between state policies and governance can also lead to the latter. Hence, in order to overcome implementation challenges within community-based adaptation, it must be kept in mind that lack of adaptation is not just a matter of awareness and understanding, but also of competing priorities; and since the 'usual no longer works', the two sources of knowledge (local/traditional and scientific) need to be bridged. This can often be easier said than done, since integrating scientific information while respecting community-driven diagnosis and fostering participation can be challenging. The global best practices linked to CBA highlight that this challenge can be overcome through policy instruments and incentives like monetary transfers (microcredit, micro-insurance, cash for work, and strong link to livelihoods); and community ownership systems (joint responsibility and decision making, trusting traditional local structures etc).

Since the paper repeatedly underlines the 'individuality' of each place and case, and that 'best practice' in one area may not be so in another, scaling up is a major CBA challenge whose solution lies in the fact that while for CBA it is the simple which is better with a focus on peer-to-peer learning, one should also find synergies with existing policy frameworks and architecture through proper diagnosis; and proper mix of measures at different levels.

Section 1 of the paper briefly provides an overview of the global climate change challenges with the subsequent section focused on global best practices of community-based adaptation in countries like Bangladesh, India, Philippines and Mozambique with important lessons for Pakistan. Section 3 is a broad overview of Pakistan's environmental and socio-economic trends in light of the potential threats of climate change to these key areas. Section 4 discusses the community-based adaptation practices of communities living in the mountainous region of Shigar Valley, the coastal region of Keti Bunder and from the plains of Southern Punjab in Muzaffargh in Pakistan. This is followed by an in-depth discourse on how to mainstream CBA within policy and development planning in Pakistan. Section 6 gives concluding thoughts.

1. Global Climate Change Challenges

In 2010-11, Maplecroft - a global risk analysis company - highlighted that 16 countries out of 170 surveyed were at 'extreme risk' from climate change over the next three decades. This Vulnerability Index, developed using 42 socio, economic and environmental indicators, ranked countries like Bangladesh (1st), India (2nd), Nepal (4th), Philippines (6th), Vietnam (13th), Thailand (14th) and Pakistan (16th), as 'extreme risk' countries along with Africa (having 12/25 countries most at risk). High levels of poverty, population increase, degrading natural resources (especially poor water supply), droughts, dependence on agriculture, heavy rainfall causing floods and rising sea levels increase the burden on states, lead to greater impoverishment (Jodha et al. 2012; Singh et al. 2011) and make developing and emerging economies especially vulnerable and less resilient to climate change and human made/natural disasters. Climate is one of the primary determinants of agricultural productivity, therefore, climate change and food availability are directly interlinked (Ludi 2009). Climate change may also initiate the vicious cycle of infectious diseases making affected populations more vulnerable to health risks (Schmidhuber and Tubiello 2007).

A 2°C rise in temperature could lead to a 4-5% reduction in annual income per capita for many countries, primarily due to their dependence on agriculture (Stern 2007; Nordhaus 2008), and with galloping population ***'even small climate shocks can cause irreversible losses and tip a large number of people into destitution'*** (World Bank 2009a, p.44).

Contrary to a popular misconception, sea level rise will not only inundate heavily populated coastlines and delta systems, but will also impact arable regions. This, in turn could lead to salinity in agricultural lands and drinking water sources causing food insecurity, water shortages and water-borne diseases with both aquaculture industry and farming communities severely affected. Climate scenarios predict that islands like Maldives, parts of Sri Lanka and Bangladesh could vanish in case of extreme coastal storms. Water shortages in the north of Pakistan and sea-level rise along the coast of Pakistan and Bangladesh could result in millions of environmental refugees flooding major inland cities making climate change both an inter- and intra-regional security threat (Nelson et al. 2010; Alam 2009).

The World Bank (2009a) estimates that more than 750 million people have faced at least one natural disaster in the last twenty years. The devastation caused by natural hazards recently in South Asia provides ample evidence of the poor capacities of governments and households to cope with hazards, e.g. during the 2010 floods in Pakistan, ***'more than 20 million people were affected (over one-tenth of Pakistan's population) with over 1,980 people reported dead and nearly 2,946 injured'*** (ADB, GoP and World Bank 2010, p.20).

Temperature changes in the mountain ranges of the Great Himalayas (which have the second largest ice mass 'water towers of Asia' in the world and provide water to ten of the largest rivers in Asia) have been dramatic, resulting in accelerated melting of glaciers from Nepal to the HinduKush (Jianchu et al. 2009). However, more current satellite imagery shows incongruous results for different parts of the HKH (Himalaya, Karakoram and HinduKush) region (Bamber 2012). Short term consequences could be increased flooding including glacier lake

outburst floods (GLOF) during the wet season, soil erosion and land slips threatening settlements in river valleys like in Attabad Lake in Pakistan in 2011. Water surges are impacting, for example, *'water availability (amounts, seasonality), biodiversity (endemic species, predator–prey relations), ecosystem boundary shifts (tree-line movements, high-elevation ecosystem changes), and global feedbacks (monsoonal shifts, loss of soil carbon)'* (Jianchu et al. 2009, p. 520).

Most Asian and African economies are dependent on agriculture-the economic sector most vulnerable to climate change. Crop yields worldwide are already declining due to climate change (World Bank 2009b). Changes in the timing of monsoons are having an adverse effect on agriculture in countries like Pakistan and India particularly (World Bank 2009a; Cruz et al. 2007), while severe droughts have created a humanitarian food and health crisis in many sub-Saharan countries.

As mentioned before, environmental health risks will accelerate with climate change, as water shortages become more acute and as more and more environmental refugees flock to urban hubs. The WHO (2012) estimates that *'Global warming that has occurred since the 1970s caused over 140 000 excess deaths annually by the year 2004.'* An increase of 3-4oC in the average temperature would result in a 100% increase in the reproduction rate of dengue virus; and meningitis due to droughts (World Bank 2010). Climate-sensitive diseases such as malaria, diarrhoea, cholera, rift valley fever, typhoid, chagas disease, schistosomiasis, river blindness, sleeping sickness and cataract blindness are also projected to increase with changes in temperature (WHO 2012, 2008; World Bank 2010), along with indirect risks of increasing malnutrition due to food insecurity. *'Empirical evidence in the realm of public health shows that one of the important determinants of human health, both across countries and within countries, is the level of income'* (Preston 1975; Pritchet and Lawrence 1997). Any shock to the income and livelihoods of people through extreme weather events is, therefore, bound to affect human health. For countries like Pakistan, especially ... *'..... impact of climate change on health may be mediated through a diverse set of causal pathways which lead to income loss due to destruction of health infrastructure and the lack of education and awareness related to hygiene'* (Malik, Awan and Khan 2010, p.44).

The effects of climate change whether environmental, economic or social are a threat to the resilience of communities especially for the ones which are directly dependent on ecosystems for their livelihoods, shelter, food security, access to basic services like water, sanitation, and energy. With India and China emerging as the fastest growing economies, Asia's GHG emissions have also increased 3.3 percent annually since 1990 (World Bank 2009a). Significant steps toward climate change mitigation are unlikely to have a major impact unless the world's largest emitters, the United States and China, take the lead. However, in efforts to lift their people out of poverty and achieving the soon-to-expire Millennium Development Goals (MDGs), these emissions will only continue to rise with growing demands for electricity in a region where 400 million people have none. Coal, being the cheapest and most abundantly available will continue to be 'the dominant fuel' powering most Asian and African economies.

Not surprisingly, however, governments have poverty alleviation as their most important priority in development planning, rather than environmental governance since Human Development Index (HDI) rankings for many of these countries remain dismal. Adaptation to climate change especially for emerging economies is, therefore, challenging and requires not just national responses, but also collective ones. For sustainable and climate-resilient development especially in South Asia, adaptation measures should focus on strengthening adaptive capacity of the poor and marginalised; investment in knowledge sharing; regional cooperation; institutional and technical capacity building; and protecting ecological services.

2.Community Based Adaptation - Global Best Practices

85% of all priority projects as identified by the NAPAs (National Adaptation Programmes of Action) pay little to no attention to local institutions' (Agrawal et al. 2009).

In recent years, the role of grass root institutions achieving development goals under climate constraints has received much attention from development scholars, policy makers and government agencies (Agrawal 2008; Jütting 2003). Several studies also show a positive impact of local level, community-based institutions on natural resource management (Lanjouw and Levy 2002; Nemarunde and Kozanayi 2002; Ostrom 1990; Mazzucato and Niemeijer 2000).

Institutions are required to structure social interactions. These are the rules humans use to facilitate their repetitive and structured situations at multiple levels of analysis (Ostrom 2005, 2008; North 2005). In order to overcome the myriad challenges posed by climate change as well as bridge policy and implementation gaps, participation of affected individuals in decision making of natural resources is critical for sustainable development (Ostrom 1990). Citizen participation and their empowerment at local level is a pre-requisite for sustainable communities (Deb 2009).

The effects of climate change will be felt first and foremost at the household (and individual) level. Dealing with these effects requires a variety of policy approaches (not just mitigation) including technological innovations, empowering local communities with the tools and information they need to adapt, and setting up mechanisms to provide relief from the effects of climate change. According to Huq and Reid (2007), the contemporary discourse about adaptation to climate change increasingly recognizes adaptation as a critical, inductive, autonomous process which evolves at the micro-level through the existing coping strategies of the most vulnerable and at risk communities and individuals and builds on bottom-up solutions. This becomes especially relevant given that, 'Adaptation strategies do not have to start from scratch: People have been managing (or failing to manage) climate hazards for centuries' (Prowse and Scott 2008, p. 45).

It is from this recognition of the importance of adaptation that the relatively nascent, bottom up concept of 'Community Based Adaptation' was born.

> *'CBA begins by identifying the communities in the developing world that are most vulnerable to climate change. These are generally very poor, depend on natural resources and*

occupy areas already prone to shocks such as floods or droughts. Once a community's vulnerability has been established, using the best available science on climate change impacts, the process of engagement with the communities can begin' (Huq and Reid 2007).

This step leads to community projects and programmes for capacity development and technology transfer following vulnerability and resilience assessments based on a nexus between climate science, social capital, indigenous knowledge and poverty (Sekine et al. 2009). Community-based climate change adaptation is...

'.....a community-led process, based on communities' priorities, needs, knowledge, and capacities, which should empower people to plan for and cope with the impacts of climate change' (Reid et al. 2009, p. 13).

CBA is, therefore, a participatory approach (Sekine et al. 2009; Reid et al. 2009) which not only harvests local knowledge and coping techniques, but also explores new adaptive measures (Prowse and Scott 2008) and advocates adaptive decision making (Bharwani et al. 2005): ***'Key concepts are the need to reduce decision uncertainty, the value of climate information and understanding actual decision processes.'*** For example, small and medium sized farmers in Thailand are reducing rice cultivation during the dry season, instead changing to more drought-sensitive crops and finding additional income. Bigger farmers are growing more crops near water sources, and building farm ponds to supplement water needs (Bantilan 2013). Vietnamese farmers work as laborers in neighboring provinces during dry spells and when it starts select appropriate crops based on local conditions.

Children are often passive victims of natural and human-made climate hazards and are hardly ever brought to the table since parents and community adults take decisions for them. However, children are unique and can act as change agents to overcome climate vulnerability and build adaptive capacity. Plan International has been doing child-led development projects in El Salvador and the Philippines. Their work has important implications for policy makers and development practitioners in the area of climate adaptation since children can:

- Analyse risk and risk reduction activities
- Design and implement projects
- Communicate risks and risk management options
- Mobilise resources and people
- Construct social networks and capital (Tanner et al. 2009).

For example, in 2005, when Hurricane Stan struck El Cipres in El Salvador, a Youth Emergency Committee facilitated evacuation of families whose houses could have collapsed; created an emergency camp in a school building; and campaigned to government officials till safer houses were donated to the affected families afterwards (Ibid.).

However, CBA is still a new construct globally[1] and it has had its fair share of trials and teething problems like mainstreaming into policy processes and scaling up from the local to regional and national echelons (Reid et al. 2009; Chishakwe et al. 2012). It is important, therefore, to learn from some of global CBA best practices and projects that are or have worked well:

Bangladesh

The ***Unnayan Onneshan*** (UO), ***Gono***

[1] Conference was held in 2005 with only 80 experts, policymakers, NGO representatives

Unnayan Kendra (GUK), ***Gono Kalyan Sangstha*** (GKS) and Shariatpur Development Society (SDS) are implementing a programme titled 'Regenerative Agriculture and Sustainable Livelihoods for Vulnerable Ecosystems' (RESOLVE). Some of their community based adaptation initiatives include:

Sandbar Cropping

In Bangladesh, floods not only '***destroy homes, villages and livelihoods, but also leave a crippling legacy when the water subsides***' (Practical Action n.d.). Silted sand plains (sandbars) appear during the dry season from mid-November to mid-April due to the decline in water flow. '***Most of the sandbars remain unutilised since sand is the main component***' (Rahman and Reza 2012, p. 14). However, a thin layer of silt which is part of the sandbars can be used for cultivation (Ibid.) of crops such as potatoes, chilli, onion, garlic, millet, tobacco and maize.

> *'Sandbars with coarse sand as a main component remained unused previously due to infertility and lack of water retaining capability. In this type of sandbar, pit cultivation technology is being practiced by simply digging holes in these sandy residues and filling them with manure and compost. In this agricultural practice, farmers make several pits of 1 m3 size in their sandy land after flood waters recede from river basin making it dry from mid-October to November. 10-15 kg compost/cow dung is mixed with the pit soil and left for 15 days. Next 4-6 seeds are planted in each pit and the pit is filled with water. After germination, 2-3 healthy seedlings are kept in each pit and the rest uprooted. The pits are then covered with straw mulch to conserve moisture. Farmers soak the pits 2-3 times a week with water carried in pitchers or buckets. When the seedlings are 25-30 days old, quick compost is applied at a rate of 1 kg/pit and by 60-65 days, it is reapplied at the same rate. After that, the compost is mixed well with the soil and irrigated immediately'* (Anik 2012, p. 5-6).

Floating Gardens

Baira, commonly recognized as floating gardens, are an ancient practice of the southern floodplains of Bangladesh in which floating platforms or rafts are made using aquatic plants such as water hyacinth and on these rafts vegetables and other crops like red amaranth, Indian spinach, coriander leaves, cauliflower, cabbage, tomato, lady finger, cucumber, bitter gourd, bottle gourd, snake gourd, ash gourd, sweet pumpkin, bean, radish, eggplant, potato, chilli, onion, garlic, turmeric and mustard are cultivated which survive during flood and water logging periods. '***This floating vegetable garden can provide multiple benefits in terms of food, nutrition and employment. It is an efficient adaptation strategy which reduces vulnerability of people living in low lying areas***' (Anik n.d).

Hanging Vegetable Cultivation

Developed by south western communities, hanging gardens aid in vegetable cultivation in water logging situation. In this practice, an earthen platform is set over a triangular bamboo frame which is filled with fertile surface soil, cow dung and fertilisers. '***The platform is placed in areas where water inundation takes place and endured for 5-6 months and where most of the places go under 4-5 feet water daily. Usually, the platform is raised 5-6 feet (1.52m - 1.83 m) above the ground. Main cultivable crops are hyacinth bean, sweet gourd, bottle gourd, wax gourd, ribbed gourd, cucumber and Indian spinach***' (Anik n.d).

India

The forest-dependent, vulnerable tribal[2]

2- 'Bihals are the third largest Scheduled Tribe in India after the Gonds and the Santhals, and one of the poorest. They are the predominant tribe in the contiguous semi-arid tribal districts in the Fifth Scheduled Areas of Gujarat, Madhya Pradesh and Rajasthan states in western and central India' (Bose 2010)

women of ***Bihal*** have been coping with droughts using community-based adaptation strategies. A ***Bihal*** household is likely to have less than one hectare agricultural land. Agriculture is labour intensive and dependent on rain. Soil erosion and low rainfall have become major factors determining choice of crops grown. Since droughts are a recurrent phenomenon in this region of western India, crop failure is common especially because discrimination against indigenous communities in India makes it harder for them to cope with the impacts of climate change e.g. tribal communities hardly ever receive drought-related relief packages.

According to Agarwal (2001), tribal women, in particular, suffer the greatest impact of poverty, droughts and land alienation. This is especially the case with the Bihal women where male household members are forced to migrate for work during recurring droughts leaving women to manage internal and external household activities (Bose 2010) with no voice in political decision making (Agarwal 1993).

Following severe drought in 2008 and 2009, ***Bihal*** men were forced migrate for daily wage employment making women household heads for several months during drought seasons. Earlier, non-timber forest products (NTFPs) like ***tendu*** leaves, honey, resins, ***mahua*** flowers, ***chirota*** supplemented household incomes. Given longer droughts and forest degradation, these NTFPs are now insufficient and women have started to work collectively to tackle climate variability challenges as well as the local government and village forest institutions which are gender insensitive, excluding women from decision making. One particular adaptation strategy has been formulation of informal women's committees that are revitalizing traditional and scientific strategies for coping with drought, like introducing horticulture on farm lands through kitchen gardens and sowing drought-resistant millets for agriculture. Kinship allows women to help one another in domestic chores and at the same time growing drought-resistant millets (Bose 2010).

In another village, women formed community grain storage facilities to help extremely poor households. Despite the local village forest organizations denying them their traditional right to collect the lucrative and useful ***jatropha*** seeds (a drought resistant plant) from the forests, these women using CBA, planted these seeds as fences on farms and communal grazing lands. During drought season, they negotiated marketing the ***jatropha*** seeds with the district tribal development office. With strong networking links, the tribal women were able to get the market rate by eliminating the 'middle man' altogether. Collective selling results in higher prices with the profits distributed based on each woman's seed production. *'The amount of jatropha seed collected from the women's own plantations (planted as fences on farm land and in open-access/grazing land) as part of their CBA activity was greater than the total quantity collected by the village forest institutions from forestland'* (Ibid).

Philippines

Local 'Non-structural' Solutions

Cavite City of the Philippines is highly vulnerable to rising sea levels, cyclones, saltwater intrusion into groundwater, erosion and sedimentation. Local adaptation initiatives like building houses on stilts; strengthening building infrastructures; and placing sandbags along shorelines though positive, are not enough because they are not included in local development plans. Communities in the area have now proposed 'non-structural', capacity-building measures which are more cost effective than those developed by the government (resettlement, shoreline protection etc.) such as creation of community early warning systems;

developing integrated coastal zone management plans; eco waste management; providing secure property rights; micro-finance/insurance schemes and creating a multi-sectoral integrated coastal zone management body (Ayers and Huq 2009).

Child-led mangrove restoration projects

According to Tanner (2009), children in community groups in Teguis are working to rehabilitate degraded mangrove ecosystems by assembling teams, collecting and replanting seedlings in reserves protected to barriers. Using knowledge from textbooks, workshops, discussions with community elders and the media, they identify benefits of mangrove restoration, *'including livelihoods gains through the provision of spawning grounds, biodiversity gains, disaster protection from typhoon winds and surges, adaptation to climate change impacts, and the removal of atmospheric greenhouse gases causing climate change'*.

Communicating risks and responses through child-led theatre

Buklod ng Kabataan[3], a group of children and youth in Banaba, are strong campaigners of CBA using theatre performances to share their views about local climate hazards like floods and river bank erosion on people's livelihoods and assets. *The children have 'became dynamic communicators of community based adaptation activities such as tree planting and solid waste management which can achieve a cleaner environment, fresh air, stabilise river banks and reduce river pollution, and reduce health risks'* (Ibid.).

Mozambique

In the province of Zambezia, Mozambique, a community-based carbon project is being implemented since 2008 in order to develop a forestry sink project to benefit poor small farmers and managed locally following the country's decentralisation policy. Based on experiences of payment for ecosystem services (PES) schemes, including the voluntary carbon market, the project has designed a payment scheme, which will keep to a minimum the costs involved in contracting, monitoring carbon, transferring payments to individual farmers and enforcing contracts (Chishakwe et al.2012).

Lessons for Pakistan

From the limited CBA projects and activities around the world given in the previous section, the following lessons or 'principles' can be drawn for application to Pakistan:

- Foreign organizations need to win community trust if they want to help them.
- Translating scientific texts about climate change into local languages, and if the situation demands, readiness to give up on the written word altogether
- Learning first-hand about indigenous community capacities, knowledge and past coping practices and only later introducing new technologies, ideas or practices.
- Highlighting the variety of shocks and stresses within a community, not solely related to climate (Chishakwe et al. 2012).
- Scaling up the participation of children in CBA requires enhanced efforts to incorporate children's perspectives, knowledge, and potential for action into regular community-driven development programmes (Tanner 2009).
- Though an adaptation project is similar to other development projects, the difference lies in the *'inputs to the intervention. It is not what the community is doing but why and with what knowledge'*.
- Adaptation is all about learning-by-doing or 'action-research' (Huq and Reid 2007).

3- Children Bonded Together.

3. Pakistan's Climate Change Challenges

Pakistan is located not only in a geo-politically strategic and volatile zone (Breyman and Salman 2010) but also in a sensitive geographical area (GoP 2010) which is vulnerable to impacts of climate changes and variability. Pakistan covers 803,940 square kilometers (310,403 square miles), with its eastern regions located on the Indian tectonic plate and the western and northern regions on the Iranian plateau and Eurasian land plate. Pakistan shares its borders with Afghanistan to the northwest, China to the northeast, India to the east and Iran to the southwest. The different types of natural features range from the sandy beaches, lagoons, and mangrove swamps of the southern coast to preserved beautiful moist temperate forests and the icy peaks of the Himalaya, Karakoram and HinduKush mountains in the north. The country's climate varies as much as the scenery, with cold winters and hot summers in the north and a mild climate in the south, moderated by the influence of the Arabian Sea. The central parts have extremely hot summers with temperatures rising to 45°C (113°F), followed by very cold winters, often falling below freezing. There is very little rainfall ranging from less than 250 millimeters to more than 1,250 millimeters (9.8–49.2 in), mostly brought by the unreliable south-westerly monsoon winds during the late summer.

Pakistan is already under pressure from climate-related stresses and this increases

Participatory Tools	Uses
Mental Models	Drivers and effects of climate change
Seasonal Calendars	Seasonality and links with livelihoods Can be combined with timelines to show perceived changes in seasonality
Timelines	Hazards and events Trends in climate (i.e. temp and rainfall)
Community Mapping and Modeling	Resources Types and causes of risks and threats Extent of vulnerable areas Vulnerable households and individuals Planning DRR/CC adaptation measures
Transect Walks	Vulnerability/risks Land-use Resources
Ranking	Vulnerabilities and hazards Coping and DRR strategies (i.e. water management options, crop varieties)
Dream Maps and Drawings	Vision of community or farm and how to achieve measures
Theatre, Poems and Songs	Awareness raising of risks and risk reduction measures Advocacy
Participatory Videos	Awareness raising Farmer to farmer communication Advocacy
Stakeholder Analysis	Institutions, relationships, power
Key Informant	In-depth discussion of vulnerability
Discussions	Livelihood sources

Table 1 gives an idea of some of the participatory tools that can be used in CBA: Source: Reid et al. 2009.

the country's vulnerability to further climate change and reduces its adaptive capacity (GoP 2010, 2003; World Bank 2009a). Droughts, especially in interior Sindh and parts of Balochistan (provinces of Pakistan) often lead to famine and widespread disruption of socio-economic well-being (GoP 2010). Temperature changes in the mountain ranges of the Himalayas have been even more dramatic, resulting in accelerated melting of glaciers from Nepal to the Hindu Kush (WWF 2008). There is increase in summer and winter precipitation over the last 40 years in Northern Pakistan and 10-15 percent decrease in coastal belt and hyper arid plains (Cruz et al. 2007). Climate change projections (including annual average temperature °C and precipitation) for 2090 show that rise in temperatures is higher for the northern mountainous areas, as compared to southern Pakistan, and that for both these regions winters will be much warmer.

Green House Gas Emissions, Temperature and Precipitation

Mean temperature trends from 1901-2000 for Pakistan have been reported and indicate an average 0.6°C rise in temperature, with a 0.35°C increase since 1960 (an average of 0.08°C per decade) especially during the Oct-December months (UNDP 2008). Since 1960, the incidence of hot days and nights has increased, while cold days and nights have decreased annually: *"The average number of 'hot'[4] days per year in Pakistan has increased by 20 (an additional 5.5percent of days) --- (while) average number of 'hot' nights per year increased by 23 (an additional 6.4percent of nights) between 1960 and 2003. The average number of 'cold' days per year has decreased by 9.7 (2.7 percent of days) and 'cold' nights per year has decreased by 13 (3.6 percent of days) between 1960 and 2003"* (UNDP 2008, p.1-2).

Annual temperatures are predicted to rise by 1.4°C-3.7°C by 2060 and from 1.9°C – 6.0°C by 2090 with the northern and mountainous areas bearing the brunt of rising temperatures, and the coastal and southern regions having frequent warmer days and nights, and the northern mountainous region likely to suffer from decreasing cold days and nights. By 2090, cold days and nights might disappear altogether in the country (UNDP 2008).

According to various World Bank figures (World Bank 2010; WDI 2010) CO2 (carbon dioxide) emissions per capita for Pakistan produced from fossil fuels burning, cement manufacture and gas flaring from 1990 till 2006 have shown an increasing trend, 0.6, 0.8 and 0.9 metric tons respectively. This, however, is still well below the global average (.45 percent). Cumulative emissions from 1850-2005 are calculated at 2.4 metric tons (billions). The total GHG emissions of Pakistan in 1994 were 181.7 million tons of CO2 equivalent (GoP 2003) which in 2008 increased to 309.4 million tons of CO2 (GoP 2010). Under a doubled CO2 climate change scenario, Pakistan is likely to have longer warm spells (Islam et al. 2009).

Rainfall patterns are changing the ecology and increasing social disparities among vulnerable groups, especially women. For example, the coastal area near Keti Bunder in the province of Sindh, Pakistan has suffered from erratic rainfall patterns, frequent and intense tropical storms in recent years (GoP 2003, 2010). When glaciers melt, lakes can be formed behind such natural ice "dams" which can cause Glacial Lake Outburst Floods (GLOFs). According to various online news sources (ARY News, Gilgit Baltistan News, Daily Times, Dawn), the latest such disaster to hit Pakistan occurred when a huge mountain landslide in the district of Hunza blocked the Hunza River and created an artificial lake on 4 January 2010. More than 36 villages were

4- "Hot day or hot night is defined by the temperature exceeded on 10% of days or nights in current climate of that region and season. Cold days or cold nights are defined as the temperature below which 10% of days or nights are recorded in current climate of that region or season" (UNDP 2008, p.1-2).

inundated. Salman (2011) indicates that the Himalayan mountain temperatures have been gradually increasing over the past several decades due to global warming which are likely to have consequences on the food and water security. The GoP Task Force on Climate Change has, therefore, called for extensive study using using *'appropriate modeling tools together with reliable information on exact contributions of snow melt, glacier melt and monsoon components, water balance of selected catchments, disintegrating glaciers, and contributions and impacts of other hydrological variables like evapotranspiration and subsurface flows'* (GoP 2010: p.17).

Air Quality

Khwaja and Khan (2005), analyzed issues related to air quality of Pakistan using the Pressure-State-Impact-Response (PSIR) framework and found that there has been a national 23-fold increase in sulphur dioxide emissions and a 25-fold increase in nitrogen oxides over the past twenty years by the industrial, transport and power sectors in the country. Particulate matter and lead levels in ambient air sites in major cities of Karachi, Lahore and Peshawar were also found to be very high compared to the World Health Organization (WHO)'s permissible levels. The Ministry of Environment (MoE) is still in the process of finalizing the Pakistan Clean Air Program (PCAP) for the management of urban air quality (World Bank 2006; PCAN 2008). Adding to this burden is the fact that at present there is no continuous monitoring station present in the country and most of the data reported is obtained from mobile monitoring units (since 2005) or spontaneous on-site sampling with laboratory based results. Pak-EPA set up fixed air monitoring stations in 2007 in five cities (PCAN 2008). A common issue for lack of compliance to water and air quality monitoring and maintenance has been limited resources, technical know-how and persistent information gaps (World Bank 2006).

Pakistan located in the Indo-Gangetic Plain in South Asia is also affected by rising toxic metals, soot, black carbon, sulphates, and aerosol mass in what are known as Atmospheric Brown Clouds (ABCs)[5] which can cause surface dimming, solar heating and increased soot deposits arising from industrial, metallurgical and fugitive emissions, vehicular exhaust, biomass burning, oil combustion, as well as transboundary air pollutants coming from India and China (Lodhi et al. 2009; Ramanathan et al. 2008). Exposure to ABC-causing agents have led to increasing road accidents, frequent disruptions in train and airline schedules in urban centres like Lahore, Islamabad and surrounding areas (Hameed et al. 2000; Lodhi et al. 2009) as well as breathing problems and allergic reactions in humans (Hameed et al. 2000). UNEP also reports that ABCs can severely impact human health, water resources and crop yields in what it calls "ABC hotspots.[6]"

Agriculture

In poor countries, as higher temperatures lead to lower agricultural output it also contracts the industrial output and aggregate investment and leads to increased political instability (Dell et al. 2008). Given Pakistan's dependence on agriculture based on its irrigation system, climate change is likely to cause an overall reduction in agricultural productivity and yields, including rangeland and livestock production, soil fertility, threatening food security, heightening the risk of famine, increased incidence of pest attacks, and manifestation of diseases resulting in negative impacts on human health (World Bank 2009a; Kelkar and Bhadwal 2007; Cruz et al. 2007). Wheat production is likely to reduce by 6-9 percent in sub-humid, semiarid, and arid areas of Pakistan like Faisalabad, Bahawalpur, D.I. Khan and Islamabad if temperatures rise by 1°C (Sultana and Ali

n clouds (ABCs) are regional scale plumes of air pollution that consist of copious amounts of tiny particles of soot, sulphates, ...tiny other pollutants" (Ramanathan et al. 2008, p.10). 6: "ABC hotspots are defined as regions where the annual mean ...pth (AOD) exceeds 0.3 and the percentage of contribution by absorbing aerosols exceeds 10 per cent (absorbing

2006). However, it has also been predicted that, *'In humid zone (northern, mountainous), beneficial effects are likely to ensue with higher temperatures up to 4°C'* (Salman 2011; Salman 2011b; Sultana et al., 2009, p.140). Hussain and Mudasser (2007) using econometric analysis have shown similar results, *'Increased temperatures correspond to an increase in Growing Degree Days (GDDs) and a decrease in Growing Season Length (GSL)'* (p.494) of wheat production in the Swat and Chitral mountainous areas of northern Pakistan.

Unfortunately, increase in temperature is likely to decrease overall agricultural output mainly due to reduction in crop life cycle especially the grain filling period (Kelkar and Bhadwal 2007), as well as adversely affect other crops like mango, cotton and sugarcane in the country (GoP, 2003). Monsoon and rainfall variability are putting net pressure on its irrigation system raising water requirement for wheat by 29 percent (Kelkar and Bhadwal 2007). The price hikes of food commodities since 2007 to date are having an adverse social impact and are a tremendous development challenge.

Agriculture is the mainstay of Pakistan's economy with 21.8 percent share in GDP and 44.7 percent of the country's work force employed in this sector (GoP 2009) with 65.9 percent of country's population living in rural areas directly or indirectly linked with agriculture for their livelihood. Frequent fluctuating performance of the agriculture sector since 2000 till 2013 has been mainly due to climate variability and the extreme weather conditions the country went through during these years, and could also be attributed to data manipulations by the various governments in power.

Food consumption, on average, has been steadily increasing over the past decade, while despite being a wheat consuming country and producing 21 percent of South Asia's wheat, not only has production been fluctuating but has also remained fairly flat. However, what is probably more alarming is that Pakistan's rate of consumption growth for rice and wheat has been less than the population growth rate which could be due to the rising global fuel and food crisis, and poor macroeconomic policies leading to higher inflation levels.

Natural Resources, Ecosystems and Biodiversity

Climate change emissions drivers are social, economic and environmental.

> *'Energy-related emissions (from production, transformation, and consumption) account for more than 65 percent of GHGs, followed by deforestation, which contributes about 18 percent. The remainder comes from agriculture and wasteland use. Deforestation and fossil fuel consumption primarily produce CO2, while agriculture and waste are the main sources of methane emissions'* (World Bank 2009a, p.35).

More than 60 percent of Pakistan's rural population depends on its natural resource base for their livelihoods, including forests, rangelands, fisheries and biodiversity. Unfortunately, not only are the country's natural resources strained and degrading (World Bank 2006, 2009a), accurate information/data about the value of its natural ecosystems, especially forests and mangroves (Gowdy and Salman 2011; M.E.A 2005), as well as emissions impact on the atmosphere, is also lacking. This severely undermines the state's efforts to devise effective policies for their conservation.

Forests are the natural climate change 'mitigators' that trap and store large amounts of carbon. Pakistan's forestry sector is made

up of a diverse, yet dwindling series of ecosystems that generate a range of socio economic and environmental benefits. In spite of the implementation of legislation and policies such as forest management plans (FSMP), the percentage of the country's mature/old growth stands has declined to cover only 4.8 percent of the country's land mass. This highlights the failure of forest sector reforms to arrest deforestation. Land degradation in Pakistan is also visible in the form of soil degradation, rangeland degradation and declining soil productivity and deforestation. Natural and anthropogenic factors contribute equally to deforestation. Geography, variable precipitation levels and water flows have negatively impacted forest regeneration patterns. Human stresses such as logging (both legal and illegal), local subsistence use and land use changes have led to woody biomass disappearing at a rate of 4-6 percent per annum, the second highest rate in the world. Forest mismanagement is characterized by a growing disjuncture between colonial forestry acts and implementation mechanisms. Forest laws and policies promote resource extraction, enforce forest protection through punitive measures and ignore community resource rights and entitlements. Forestry mismanagement, however, is influenced by an amalgam of corruption, collusion and neglect; involving stakeholders such as the forest department (FD), timber contractors cum politicians, developers and community elders (Khan and Khan 2009). Among the neoliberal drivers are perverse incentives, rising prices of timber, fuel wood and fodder; falling wages of forestry officers, all of which exacerbate mismanagement and deforestation.

Forested regions, mangroves, and wetlands, can buffer the impacts of climate change. However, with the climate changing so rapidly, these ecosystems are at risk, and more proactive, adaptive approaches are needed, especially for a developing country like Pakistan. Mangrove ecosystems are important for maintaining the many commercial fish species along the Pakistan coast. The rate of degradation of mangrove forests in the delta has been estimated at 6 percent between 1980 and 1995 and only 15 percent are considered to be healthy. Pakistan's status of mangrove coverage has an alarmingly downward trend since 1985 due to excessive use as fuel wood, fodder, poles, camel grazing, as well as industrial pollution (Salman 2011a; Gowdy and Salman 2011) and increased salinity due to the construction of dams.

Pakistan also has a large and diverse heritage of flora and fauna. However, this biodiversity is currently under threat from natural and human pressures. It has been reported that 31 mammal, 20 bird and 5 reptile species are endangered and several more included in the Convention on International Trade in Endangered Species of Wildlife and Fauna (CITES). Climate change will be an additional stressor and may lead to changes in habitats causing both species and human migration or extinction (Ibid.).

Coastal areas are particularly vulnerable with rising sea surface temperatures and atmospheric water vapor likely to cause an increase in tropical hurricane intensity and rainfall. Over fishing and polluted waters are contributing to the reduction of productivity of the marine and inland fisheries, as well as posing direct health threats to local fisher-folk communities and their livelihoods (Salman 2011a). Fishery as a sub-sector of agriculture plays a significant role in the national economy and towards the food security of the country, as it reduces the pressure on demand for mutton, beef and poultry. It is also considered to be the principal source of livelihood for the communities inhabiting the long coasts of Sindh and Balochistan, as well as along the major rivers, lakes and dams. It contributes, on an average, about 0.3 percent to the total GDP and 1.3 percent to agriculture.

During 2008, the performance of this sector was quite low (2.6 percent), as compared to the 9.2 percent reported for 2006-07. It has been estimated that about 400 thousand fishermen and their families are dependent on fisheries for their livelihood (GoP 2009). The detrimental effect that climate change, such as *'increased upstream intrusion of saline water in the Indus delta, (is) adversely affecting coastal agriculture, mangroves and breeding grounds of fish,'* (GoP 2010, xiii). Unfortunately, as admitted in the latest government report on climate change (2010), the fishery sector has largely remained neglected.

It is only recently that the government has outlined plans in its Vision 2030 documents to strengthen its forestry and fisheries sector by providing technical and financial assistance to the fisherfolk; start initiatives to utilize brackish water for aquaculture; promote social forestry; intensify afforestation efforts; launch a national sustainable land management project; enforce soil conservation measures; promote rain water harvesting and improve integrated watershed management, amongst others (GoP and PC 2007).

Fresh Water Quantity and Quality

The drinking water for much of India and Pakistan comes from the Himalayan, Karakoram, and HinduKush glaciers that are already beginning to melt from warmer temperatures (Jianchu et al. 2009). By the year 2050, 2.5 billion people in South Asia will be facing water scarcity. Analyzing the potential impacts of climate change on the Indus River basin it is concluded that the total annual run-off from the upper basin is likely to increase by 11 to 16 percent. It estimated that although increased run-off could be advantageous for water supply and hydropower production it could aggravate problems of flooding, water logging, and salinity in the upper basin. Climate models indicate that this melting will accelerate in the coming years with unknown, but severe consequences on drinking water, agricultural irrigation, and human health. There is already evidence for South Asia that extreme climate poses a threat of floods, droughts and storms. Exceeding the 2 degree C threshold will change the world's water distribution. There would be ecological chaos due to accelerated melting of Himalayas (LEAD 2008).

Pakistan's water resources are not evenly distributed and are often not located where there is the greatest demand. Unequal access and distribution (less water is available for Sindh and Balochistan provinces than Punjab, andpoor farmers), together with a growing population, drinking water supply, sanitation and storage capacity, urbanization, progressive industrialization and now climate risk make water management problems a difficult challenge for the country. Pakistan was water-abundant in the past, but now it is a water-stressed country with hardly 1,300 cubic meters per capita.

Besides, there are other issues such as salinity and water logging in Pakistan, as in agricultural sector, one-third of agricultural land is water-logged, and 13 percent cultivable land is saline. By 2025, Pakistan is likely to become a water-scarce country. The role of women in water domestic and productive water use is crucial, but unfortunately their role remains unrecognized and voice unheard which is indicative that Pakistan's water problem is that of ineffective management, rather than availability. It is only in November 2009, that the government finalized its drinking water standards under its National Action Plan to implement the National Drinking Water Policy.

4.Climate Change Adaptation Practices In Pakistan

The Case of Shigar Valley[7]

Shigar Valley, is located along the right bank of the Indus River in Central Karakoram, Pakistan. The famous mountain K2 lies to the North of the valley, while the town of Skardu lies at its South. Nagar valley is in the West and District Ghanche is to the East. It is situated at an altitude of 2,798 meters above sea level. The valley is a sub division of District Skardu with 62 villages.

The valley is rich in architectural monuments like ***khanqahs,*** mosques, and forts. The town of Shigar alone has more than 20 important historical sites. Land use in Shigar can be classified as settlement areas with orchards, cropland and irrigated meadows. Every household has about 10 to 15 kanals land; there are some families which have even bigger farms e.g. 100 to 150 kanals. The majority of irrigated land is used as cropland.

Salman (2011; 2011b)'s analysis of climate change impacts in the area over the period (1989 - 2009) found that community members perceive that the climate of Shigar has changed greatly over the past twenty years which has affected the natural environment, traditional lifestyle and livelihoods of the local population. His study reports that there has been change in winter temperature, precipitation (rain and snow) and unusual weather patterns in the Valley.

Given the anthropogenic climatic effects, the mountainous region of Shigar is experiencing both positive and negative impacts of climate related changes. While economically, the less harsh winter now gives locals more time to remain active in their fields and jobs, the loss of biodiversity/animal and bird species and severe deforestation in the area is a cause of great concern. Not surprisingly, local government officials have very little empathy regarding the various changes in cropping patterns, loss of forest cover, animal species, and sanitation problems shared by communities. Lack of understanding about the issue of climate change and its impacts amongst the officials is also prevalent.

It is very important to remember that while climate changes in precipitation and temperature have slow onset, they often lead to long-term losses in agriculture, biodiversity and livelihoods (UNFCCC 2007). Therefore, it is imperative to recognize, document and understand past environmental related changes in comparison to present experiences in order to deal and plan accurately for climate variability. This not only provides valuable information but also reduces vulnerability to climate related disasters. Here the role of local, traditional institutions and community led adaptation is crucial in building resilience into the development and investment plans for the region.

Livelihood and agricultural strategies are rooted in available natural resources, as well as in the social and cultural structures. Using local, traditional knowledge the Shigar locals have used crop diversification strategies to adapt agricultural practices. However, efforts to buffer their attempts need to be made by developing climate-resilient, adaptive crops and seed varieties. The government should encourage, through tax incentive schemes, communities who have undertaken crop diversification (leading to improved food security) steps on their own initiative.

While Shigar does not face any immediate water availability issues for irrigation and domestic, household use, community

or's extensive field work in the area and his subsequent publications on the issue. See References.

managed and owned water filtration plants have been set by a local NGO. Due to the rise in population and subsequent escalation in demand for clean water, localized rainwater harvesting and surface water storage is also being encouraged (Salman 2011; 2011b).

The Case of Keti Bunder[8]

Keti Bunder is part of the Thatta District in Pakistan's Sindh province, located 200 km south-east of Karachi. It is part of the Indus Delta and its four major distributaries – the ***Chan, Hajamoro, Khobar*** and ***Kangri.*** Keti Bunder consists of 42 village clusters (called ***dehs)*** spread over a total area of about 60,000 hectares. The village settlements are built on mudflats between the various channels of the major Indus distributaries. The majority of the people in Keti Bunder are fishermen and belong to more than a dozen castes, most of them engaged in small-scale business and agriculture.

Before 1950, Keti Bunder was a major port and the center of a prosperous fishing and agricultural area. The entire area now faces a number of severe socio-ecological problems and a resulting loss of livelihood opportunities. As a consequence of the construction of dams and other barriers upstream slowing the downstream water flow, and sea level rise, salt water intrusion from the sea has become a major problem. To make matters worse, the area is vulnerable to cyclones and tsunamis. The intensity of these cyclones has increased significantly during the last 30 years possibly due to global warming. Keti Bunder residents confirm (1) a decline in the health of mangroves, (2) the depletion of the stocks of major fish species, (3) reduced rainfall, and (4) an increase in extreme weather events. These negative trends are the result of complex interactions between exogenous physical changes (climate change and the reduced availability of fresh water) and changing patterns of resource use within the villages (overfishing and the destruction of mangroves). Thousands of Keti Bunder residents may be displaced in the next few years due to the impacts of storms, rising sea levels, and other expected effects of climate change (Salman 2011a; Gowdy and Salman 2010, 2011).

Declining fresh water flow has negatively affected fish and shrimp breeding and the upstream migration of the once plentiful ***palla*** fish has dramatically declined. There is a water shortage in all villages in the area and water for drinking and cooking must be purchased from sellers in town. The shortage of clean drinking water is the main cause of many illnesses. A lack of health facilities also contributes to the increase in diseases. The common diseases in the community are diarrhea or dysentery, typhoid, hepatitis B, asthma, TB, malaria, skin and eye infections and other seasonal diseases.

A few decades ago the people of Keti Bunder had multiple options for economic subsistence. But the decline in fresh water forced a major change from agriculture and livestock to fishing. A growing population has increased the pressure on natural resources especially the mangrove ecosystems. Due to inadequate alternate employment opportunities, the pressure on fisheries resources is intense and its demise directly affects the livelihoods of everyone in Keti Bunder. The direct economic effect of the loss of fresh water has been the complete loss of the agricultural sector. Indirect effects are the increased incidence of water-borne diseases, other effects of the lack of fresh drinking water, and the disappearance of several fish species. Many of these effects are hard to quantify, much less measurable using market values. If only market-measured income losses are considered, the livelihoods of poor will always be overwhelmed by the monetary

8 The case is based on the author's extensive field work in the area and his subsequent doctoral and academic publications on the issue. See References

gains to the wealthy.

The contention that the subsistence of the poor is largely composed of direct ecosystem services is confirmed in Keti Bunder where the coastal ecosystem is under serious threat both from environmental changes and institutional failures. To the extent that Keti Bunder is representative, both of these factors are likely to become more serious in South Asia in the future. Therefore, understanding local institutions, institutional failures and the community based adaptation activities is key to formulating effective social and environmental policies.

An ominous factor when it comes to Keti Bunder is the increased institutional failure arising from migration, ethnic conflicts, and changing power relationships. Environmental deterioration has caused occupation switching of one group ***(Jaats)*** from agriculture to fishing causing increased pressure on fish stocks from unsustainable fishing techniques. An apparent increase in the number of camels owned by the ***Jaats*** has caused conflicts over mangroves and exacerbated their destruction. These sorts of resource conflicts among the world's poorest are happening throughout the coastal areas of South Asia and will likely get much worse as climate change disrupts local ecosystems.

The crucial question for us is how are the communities in Keti Bunder responding to and coping with their changing environment and its socio-economic impacts? Has institutional governance (especially informal in the form of CBA) played any role in strengthening or weakening the adaptive capacities of the villagers? Findings by Salman (2012; 2011a, 2010) and Gowdy and Salman (2011; 2011a) indicate that local, traditional institutions are being revived and re-vitalized by non-government actors working extensively in Keti Bunder with the participation of communities. Given the relative nascence of these new institutions it is too early to evaluate their success or failure. However, the effectiveness, innovation and sustainability of present coping and future adaptive mechanisms in Keti Bunder will depend on these new local community-based adaptation initiatives and relationships. Communities at Keti Bunder are practicing different adaptation measures like storage of water, food, medicine and livestock; communal pooling including mangrove re-plantation, information gathering, disaster-safe infrastructure development; and diversification are the prevalent coping strategies. Mobility is temporary and households who have relatives or contacts in urban areas tend to migrate. Exchange, however, is the least applied strategy due to limited infrastructure and administrative issues like absence of banks and insurance companies.

More specific CBA techniques include maintaining a band of natural saltwater tolerant mangrove forest between mudflats on which huts are constructed and the sea in order to help protect the former from strong waves, wind and cyclone damage. Mud is also used to raise or build huts on above sea level intrusion. Having mangrove plantations around these mudflats also prevents soil erosion. These informal localized structural adaptive techniques are unique to Keti Bunder (Salman 2011a, 2010). Relatively newer structural changes to hut construction developed and taught by WWF-P are now being increasing integrated with the more traditional practices. As cyclones are forecast, ropes are tied around the huts, boats are taken away from the sea and heavy anchors placed to secure them. Livestock ropes are, however, opened so that animals can move freely and save themselves.

Despite meager subsistence living, females do save money – albeit in nominal amounts - and contribute it to an informal 'savings committee' organized by various fisherwomen on a three monthly basis, depending on

household income during those months. Due to the strong presence of a non-government organization in the area, communities have been able to find relatively faster financial and food/water support following major natural disasters such as the Yemyin cyclone in 2007, and the more recent Phet cyclone in 2010. The role of provincial government and its response, however, in this respect remains fairly slow, bureaucratic and 'insensitive'.

While there is some natural regeneration of mangroves, communities, especially informal womens' groups, are participating in replanting mangroves. Rehabilitation efforts have been underway on nearly 7,500 acres of mudflats, with a primary focus on planting ***avicennia*** marina since it needs limited fresh water. In July 2009, 300 local community members of Keti Bunder broke the Guinness Book of World Records for planting the most trees, in this case 5,41,176 ***rhizofora mucronata*** of the mangrove species in one day. Community-led mangrove and vegetation plantation is seen as one of the best measures for building resilience against sea intrusion and storms, as well as reducing coastal pollution and improving economic livelihoods by communities (Ibid.).

Keti Bunder residents have also established a Farmer Field School where Integrated Pest Management (such as using farmyard manure and lanterns to kill insects) is practiced on a small piece of land. The farmers trained at this School go on to train other farmers in their villages in the hope of re-vitalizing interest in growing vegetables on barren yet cultivable land. It is important to point out that while an NGO provided technical expertise and vegetable seeds for this initiative, farmers themselves pay for their time on a voluntary basis.

The role of NGOs in spreading awareness about ecological conservation in Keti Bunder, as well as supporting CBA cannot be underestimated e.g. while the local government has managed to set up only three CBOs/village organizations on paper with limited impact on community empowerment, civil society organizations have formed several on self-help basis with strong community involvement. Members of the locally managed informal institutions are being trained in activities of mangrove conservation/plantation; skill development in order to diversify employment opportunities, as well to improve the management of their current livelihoods; and are being sensitized to organize themselves to collectively stop mangrove logging and cattle grazing.

Local festivals are an organic and natural tool for strengthening adaptive capacities and creating awareness. It was found that community members organize special theatre shows and songs focusing on issues such as mangrove protection, changing weather conditions and sustainable fishing practices.

The Case of District Muzaffargarh[9]

Muzzafargarh District, with a population density of 320 people per square kilometer, is one of the oldest districts in Punjab and consists of four ***tehsils*** (Muzaffargarh, Alipur, Kot Adu and Jatoi). While the 1998 census indicated high unemployment rate, the rise of industrialization in the area has led to employment being generated. However, rural areas are still primarily dependent upon agriculture for their livelihoods. Sugarcane, rice, wheat and cotton are the major crops, while pomegranates, mangoes and dates are the major fruits grown in the district. The hot summer is from April-September, whereas the significantly cold winter is from mid November- early February. Although the region is prone to having a moderate monsoon with annual rainfall of 21mm, 2010, 2011 and 2013 rains caused severe damage given the area's location between Rivers Chenab and Indus. Save the Children (2010) reported that the 2010 floods affected nearly

9- The case is based on LEAD Pakistan's work in the area under its Local Adaptation Plans of Actions (LAPAs). See References

700,000 people with 81.2 percent of housing structures totally damaged and 49.5 percent of communities reporting their livelihoods as completely destroyed. According to newspaper reports, more than 165 villages of ***tehsil*** Alipur and ***tehsil*** Jatoi were flooded which destroyed standing cotton, pulses and rice crops in August 2013.

Under its Climate Leadership for Effective Adaptation and Resilience (CLEAR) project, LEAD Pakistan facilitated and trained local communities and Community Based Organizations (CBOs) to work together with local government officials to develop on-ground Local Adaptation Plans for Action (LAPAs) for the district. The organization in December 2013 conducted Vulnerability Assessment (VA) and community-based Focused Group Discussions (FGDs) in the area and through these it was identified that *'unpredictable monsoons, rise in salinity due to lack of proper drainage system and its harmful impact on crop yields'* is the single most important, local and 'approachable' issue for Muzaffargarh district.

Partner Organizations and community members also identified *'rehabilitation/construction of salinity drains and plantation on banks'* as the most affordable and realistic solution at the local level. Through community level activities and initiatives such as recognition of old salinity drains or new locations for them; cleanliness campaigns; providing incentives to farmers for cleanliness of drains and plantation near them; developing stronger flood and rain warning local systems; as well as public policy engagement through improved coordination meetings with government departments achieved with the nomination of a focal person from the Irrigation & Agriculture Department; and competitions among farmers on drains' cleanliness and plantation, there is certainly a stronger chance of the region faring better in case it is faced with any future flood disaster.

While these LAPAs are still in the initial phase of their implementation, they probably represent the first conscious and deliberate attempt to initiate a comprehensive process of community-based adaptation in Pakistan. As such, while a particular kind of local adaptation may not be suitable for another community in a different agro-ecological zone – it will not be in most cases – the process itself is generic enough for application across the country.

5.Mainstreaming Community Based Climate Change Adaptation In Pakistan

Mainstreaming in this context means..

> *'....to consider and address risks emanating from natural hazards in medium-term strategic development frameworks, in legislation and institutional structures, in sectoral strategies and policies, in budgetary processes, in the design and implementation of individual projects and in monitoring and evaluating all the above'* (Benson et al, 2007, p.6)

It is about incorporating adaptation into prevailing policies, plans and practices rather than in isolation so that: a. limited resources are used more efficiently; b. adaptation is highlighted as a critical issue and; c. synergies are developed between development and adaptation.

Mainstreaming has been applied to poverty alleviation/reduction as well as gender and it is certainly not an easy process since it cuts

across both sectoral and institutional barriers. However, it is *'the most effective way to scale-up adaptation across the Asia and Pacific region'* (Davis 2013). Both mainstreaming adaptation and development planning are multi-level including national, sectoral and local levels. *'Applying a climate lens to plans and policies can help climate-proof investments and identify key adaptation needs'* (Ibid.). Given below is a brief summary of some of the analytical frameworks which can be used for mainstreaming community-based adaptation (Table 2):

Analytical Framework	Focus of Analysis	Key Analytical Questions	Tools for Data Collection
Moser Framework	▪ Practical needs and strategic interests ▪ Gender Identification	What are the practical needs and strategic interests	▪ Needs Assessment
Social Relations Approach (SRA) Framework	▪ Analyze existing inequalities in distribution of resources, responsibilities and power	Who has what and what are the relationships between people.	▪ Institutional Analysis ▪ Socio-political Profile
Capacities and Vulnerabilities Analysis Framework	▪ Existing capacities (strengths)and vulnerabilities (weaknesses)	What will help and what will hinder	▪ Capacities and Vulnerabilities Assessment
Harvard Analytical Framework and People-Oriented Planning	▪ Roles and activities ▪ Allocation of resources ▪ Productive and socially reproductive work	Who does what, how where and what influences it	▪ Activity Profile ▪ Access and Control Profile ▪ Influencing Factors

Table 2: CC Adaptation Frameworks

Source: Adapted from UNDP 2010.

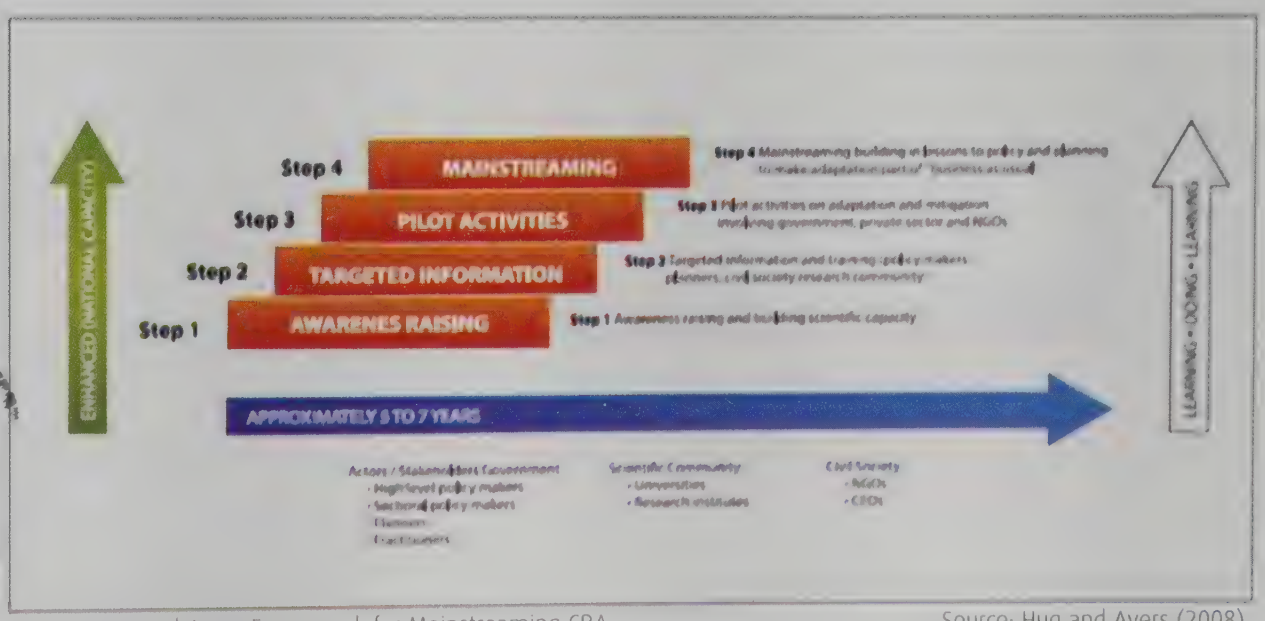


Figure 1: Huq and Ayers Framework for Mainstreaming CBA

Source: Huq and Ayers (2008).

Apart from the above frameworks, Huq and Ayers (2008) model is also widely used for mainstreaming adaptation, particularly community-based adaptation.

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The latter reiterates that mainstreaming is a long term, iterative process that can take many years. It includes the following steps:

1. raising awareness about climate change issues;
2. collecting relevant information about sector/level specific climate concerns being engaged;
3. capacity-building and collaboration with planners and policy-makers;
4. testing new strategies and policy approaches;
5. developing next stage planning based on lessons learned so that with the passage of time, adaptation becomes part of "business as usual" (Davis 2013).

Many of the initiatives and CBA projects shared in Section 2 were either in pilot stages or had only been used for a few years and so vastly dependent on either external donor funding or non-state actors. Therefore, wider uptake and up-scaling of CBA into policy planning needs to have:

1. An enabling institutional policy environment;
2. Respect for traditional knowledge and institutions;
3. The right set of incentives and costs for communities; and
4. A cooperative regional environment.

Such a 'tailored' CBA framework for Pakistan is represented in Figure 2, a detailed discussion of which follows.

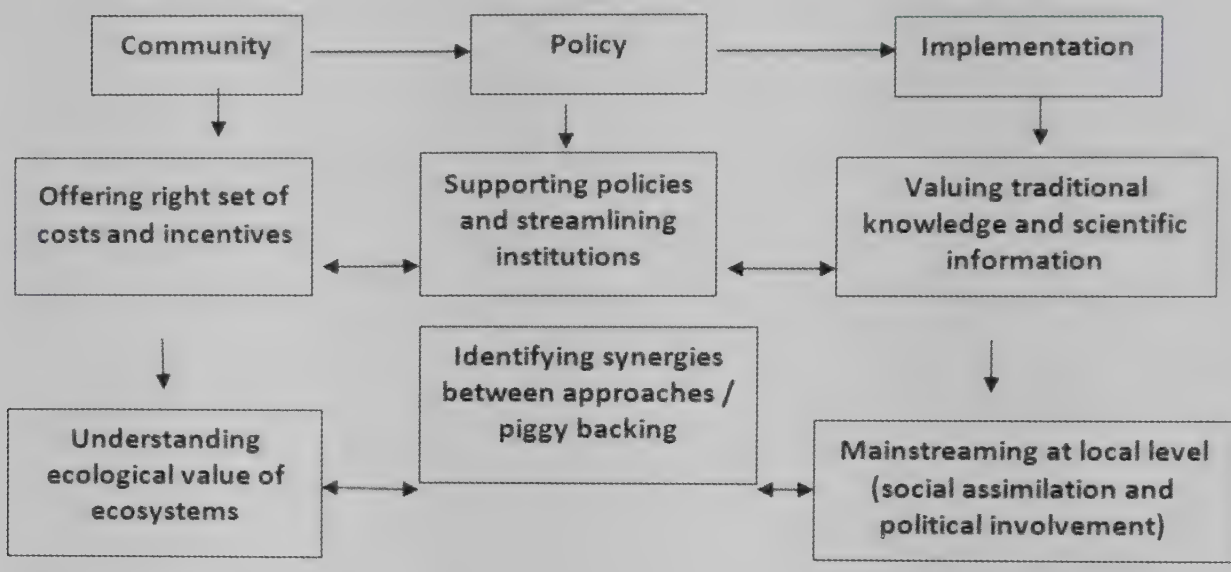

Figure 3: CBA Framework for Pakistan

Source: Author's schematic.

1. An Enabling Institutional Policy Environment

An enabling environment is ...

> *'...a set of interrelated conditions – such as legal, organisational, fiscal, informational, political, and cultural – that impact on the capacity of development actors such as CSOs to engage in development processes in a sustained and effective manner'* (Thindwa 2001).

Successful implementation of CBA requires:

a. supporting policies and streamlining institutions;

b. identifying synergies between key approaches and sectors/piggy backing;

c. mainstreaming at local level; and

d. understanding ecological value of biodiversity and ecosystems.

1a. Supporting Policies and Streamlining Institutions

From the cases shared, it is clear that national policies, laws and institutional arrangements

should not hinder nor harm the achievement of CBA, rather they should strengthen community resilience and conserve ecosystems from the future impacts of climate change. For example, the case of Keti Bunder in Pakistan (Salman 2011a) explains how Pakistan's deep sea fishing policy formulated in 1982 has seen frequent changes due to the problem of dual jurisdiction. Another example of state policy disjunct in Keti Bunder is that in 1995, the provincial government explicitly banned fine-meshed nylon-based ***katra*** and ***gujjo*** nets due to their adverse ecological impacts. However, the ban is almost never implemented resulting in over-harvesting and depletion of fish stock and biodiversity (Salman 2011a). The case of Muzaffargarh where LAPAs have been developed by communities themselves, the role of the government taking greater interest in local level issues comes out vividly. It is hoped that following the 18th Amendment, provinces will take more decentralized actions to support local level initiatives especially in areas which are particularly vulnerable to climatic challenges.

It is noteworthy that the National Climate Change Policy 2011 of Pakistan does propose several community-based adaptation approaches like e.g.

- Promoting level expansion of cultivated lands and rainwater harvesting;
- Promoting feed conservation techniques ;
- Creating fodder banks in arable areas;
- Creating environmental and forest protection clubs at community level; and
- Encouraging community participation in developing evacuation plans (GoP 2011).

Both state and non-state actors also need to realize and understand that climate change affects communities differently. This is very clear from the Shigar, Keti Bunder and Muzaffargarh cases where one region is finding changes in climate beneficial at least in the short to medium term and the other region is facing harsher climate variability challenges. CBA initiatives, therefore, need to be intrinsically 'local' and 'context-specific'. An effective enabling environment for CBA should therefore have a broad-based, open-minded, innovative governance architecture at the macro level.

Special attention should be paid towards mainstreaming CBA into national development strategies and plans since they formulate long-term investment priorities and goals. Having knowledge about climate risks and how communities on the ground are tackling them can help in the creating of robust options – for example not building dams where the rivers are running dry nor setting up coastal infrastructure where sea level is likely to rise.

> *'A climate lens can also help planners understand cross-sectoral trade-offs and interactions, such as the water-supply implications of energy choices, or the flood-risk impacts of clearing mangroves to build shrimp farms' (Davis 2013).*

There are several other policy and legal measures that can encourage CBA and enhance community resilience. The most effective measure is supporting 'community empowerment', through devolution. This measure can be sector-specific as well to respond to the sector-sensitivity of vulnerability. For instance, national polices and laws about forests, fisheries and wildlife, should guarantee community participation in decision-making processes in different ways that are specific to their respective sectors. What is key, from a policy and legal perspective, is ensuring that there is 'complete' devolution where community resilience needs are expressed and prioritised; and that the nature of the devolved powers is such that it can assist communities to respond to their vulnerability, including making decisions on resource allocation. Because

community climate change vulnerability is inextricably linked to poverty; it also important for CBA policy and legal frameworks to facilitate alternative livelihoods options for communities. Without necessarily prescribing particular options policy and legal measures can create an enabling environment for the promotion of diversified rural livelihood options (Ibid).

As mentioned earlier, sector-specific plans guide large-scale investments so it is also important to make sure that development proposals avoid confrontational, unintentional consequences or maladaptation. Sectoral planning is critical because vulnerability is highly sector-specific. Adaptation measures to improve water supplies, for example, should most likely be developed in the context of water planning.

Supporting policies and sectoral planning can never work unless the macro-level institutions are streamlined. In Pakistan, for example, the Earthquake Reconstruction and Rehabilitation Authority (ERRA) appeared immediately after the 2005 South Asia earthquake, while the National Disaster Management Commission and Authority (NDMC and NDMA) were set up in 2007, both of which have overlapping functions. The importance (or lack thereof) given to CC and disaster risk reduction (DRR) can be seen from the fact that various governments have been 'renaming' the primary body in Pakistan,[10] earlier called the Ministry of Environment (MoE), then named the Ministry of Disaster Management in October 2011 and now called the Ministry of Climate Change. A few pre-2005 organisations such as the Federal Flood Commission, Pakistan Directorate General of Civil Defence, and Provincial Irrigation and Drainage Authorities also already exist. Given the nature of human made and natural calamities linked to climatic variability it is important that Pakistan restructure and simplify its state-level institutions to get rid of redundancies and inefficient overlaps to deal with or oversee

community-based natural resource management (CBNRM), DRR and climate change activities.

1b. Identifying synergies between key approaches and sectors/piggy backing

Practically, community-based natural resource management (CBNRM) and disaster risk reduction (DRR) have a longer history, dating back several decades with unlimited case studies and literature, while CBA is a relatively nascent yet promising area of climate change adaptation, with fewer documented activities and programmes to its credit and 'less established definitions and concepts' (Chishakwe et al. 2012).

Like CBA, community-based natural resource management (CBNRM) is not just an outcome, it is a process that involves 'gradual devolution

Figure 3: Pillars of CBA and CBNRM Source: Chishakwe et al. 2012.

of natural resource management through community decision-making processes' (Ibid.) and is a long-term strategy towards community empowerment and improved natural resource management. While CBNRM activities work towards poverty alleviation and natural resource conservation, CBA decreases vulnerability to climate change and strengthens adaptive capacity. Both approaches have similar and complementary aspirations, with the only exception being that CBA processes are still underdeveloped (Ibid).

[10] Supposed to develop 'national policies, plans and programs regarding environmental planning, pollution and ecology, and to conduct dealings h other countries and international organizations in the fields of environment' (GoP, 2010, p.52).

Figure 3 highlights the central pillars of CBA and CBNRM and the processes embedded within each that overlap:

Like the CBA frameworks, the Hyogo Framework for Action (HFA) 2005-2015 sets the tone for building capacities of communities for disaster risk reduction (DRR):

> *'...Disaster risks can be substantially reduced if people are well informed and motivated towards a culture of disaster prevention and resilience, which in turn requires the collection, compilation and dissemination of relevant knowledge and information on hazards, vulnerabilities and capacities'* (UN/ISDR 2005, p. 9).

Both DRR and CBA efforts share the risk-reduction goal and can learn from each other especially since including the latter into policy planning will mean a *'shift in focus, from early-warning systems and emergency relief and recovery, to addressing the drivers of vulnerability, including poverty, weak institutions, and misguided development choices. It may also require coordination between different ministries'* (Davis 2013).

Since both CBNRM and DRR provide a ready-made infrastructure[11] on which CBA could be built, CBA 'piggy backing' on CBNRM/DRR infrastructure in Pakistan will reduce costs in terms of community organization and management capacity building etc. Plus, many development practitioners 'know the learning curve' that they will apply to CBA at reduced costs in terms of expertise institutions and networks; regional and local markets. Also, given the inter-community dimension to climate change adaptation it becomes essential to integrate the efforts being carried out by a myriad of actors at the community level.

The climate challenges standing in Pakistan's way are going to affect its irrigation and water resources particularly as indicated earlier, hence, the water and agriculture sector should also be prioritized for mainstreaming adaptation. Countries like India and Bangladesh are adopting integrated water resources management (IWRM), which could facilitate adaptation planning through participatory processes at the river basin level. The NCCP of Pakistan has proposed promoting integrated watershed management including ecological conservation practices in uphill watersheds (GoP 2011) and one hopes this recommendation will not merely remain confined to paper. Given the complexity of flooding in the Muzaffaragh district in Pakistan (located between two rivers) , it is important to point out that CBA along a riverine area would be crucially contingent upon the larger development paradigm adopted by the state for water resource management.

From the global best practices shared and the case of Keti Bunder in Pakistan, it becomes self-evident that conservation planning is an obvious good entry point for CBA *'in the context of protecting vital ecosystem services (e.g., coastal buffers, regulation of water flows, prevention of erosion and landslides), and in protecting livelihoods'* (Davis 2013). Despite efforts by organizations like WWF and IUCN, within the policy arena, conservation is less valued even though the livelihoods of many in Pakistan depend on climate sensitive activities.

CBA initiatives are primarily agriculture and natural resource based (forestry, farming etc.) and depending on the region, these sectors are typically gendered in terms of roles and responsibilities as indicated by the *Bihal* tribal women case. Special attention should be given to concurrently promoting women's adaptation to climate change, where 'target sectors' are traditionally considered the male domain, through more gender-sensitive frameworks as given in Figure 1.

11- Such as policies, institutions, M&E systems, community capacity and cross-learning and peer review mechanisms

1c. Mainstreaming at local level

Adaptation can be driven by national-level policies and strategies, but it also needs to be tailored to local needs and conditions, and that means mainstreaming adaptation in local government planning and policies. The benefits are clear: local officials have the best view of conditions on the ground, and local-level processes can more easily engage vulnerable populations. However, there are major obstacles to addressing climate needs at the local level as we saw in the case of India. Knowledge (or awareness, even empathy) of climate issues is limited both at the national level and lower levels (as in Shigar Valley, Pakistan).

Building the capacity of communities strengthens social capital by *'creating strong bonds among members i.e., making them resilient and safe from disasters'* (Kuhlicke and Steinführer 2010). Mainstreaming can, therefore, be achieved by promoting social assimilation and political involvement (Ibid.). This should be done through the following mechanisms:

1. Innovation: support the ability of communities to innovate and take risks (and protection from risk of failure), including experimenting and exploring solutions;

2. Institutions and entitlements: ensure equitable access and entitlement to key resources, while embracing the need to ensure equitable opportunities to all groups (particularly the marginal and most vulnerable);

3. Information and knowledge sharing: permit communities to assess adaptation options and implement the most suitable interventions, which in turn depends on the existence of systems to distribute relevant information at various levels;

4. Asset base development: facilitate the availability of various financial, physical, natural, social, political and human capital/s necessary to best prepare a community to respond to changing climate governance;

5. Governance: facilitate informed decision-making, transparency, and prioritization at the same time ensuring that local organizations are informed on future climate impacts and take appropriate measures to plan for the future.

1d. Understanding ecological value of biodiversity and ecosystems

Evidence suggests that biologically diverse ecosystems are more resilient to environmental shocks than less diverse ones (Tilman and Downing 1994) although the relationship between resilience and biodiversity is complicated (Robinson 1992). If a system loses its resilience it can quickly and irreversibly flip to another state (Walker et al. 2004). Furthermore, it is impossible to tell ahead of time what the loss of a species or species relationships will do to the system. In general, removing keystone species from an ecosystem will have significant (and non-marginal) effects. For example, Brock and Kelt (2004) removed kangaroo rats from a plot of land in the southwest U.S. and the result was a significant increase in plant cover, significant declines in bare ground, and declines in seed predation. Bromley (1998) refers to this as 'functional transparency' – the effects of removing a species or otherwise altering an ecosystem can only be known after the alteration. More scientific R & D is, therefore, critical to understanding how Pakistan's ecosystems are changing or likely to.

In conclusion, an enabling institutional policy framework that responds to community vulnerability, within the context of CBA, should strengthen community resilience which includes enabling 'a community to identify climate-related threats on one hand, and the resilience to exploit opportunities and recovery from the impacts of climate change, on the

other' (Chishakwe et al. 2012). The framework should create opportunities and options, remove policy hindrances (especially for women and other marginalised groups) and to adapt to the impacts of climate change. As discussed above, since vulnerability can impact diverse sectors (agriculture, coastal zones, forestry), the nature and focus of resilience is sector-specific.

2. Learning from Traditional Knowledge and Institutions

Helmke and Levitsky (2003, p.17) write that

> *'...spontaneous informal institutions emerge independently of (and frequently predate) formal institutional structures. Although they generally co-exist and interact with formal rules, spontaneous informal institutions are created in response to incentives that are unrelated to those rules. Examples include indigenous or "traditional" institutions such as custom laws and kinship-based norms, as well as norms of clientelism, patrimonialism, and other particularistic institutions that coexist with new electoral and market institutions in much of contemporary Africa, Asia, Latin America, and post-communist Eurasia.'*

Pakistan's traditional informal institutions are social and political power structures that have their origin in the pre-colonial, pre-independence institutions like Village Communities (VCs) which are now part of the country's grass-roots, local systems of governance (Pasha 2005).

The concept of community integration needs to be understood in the broader context of Pakistan's poor, rural communities which have rich folk and religious traditions that promote self-actualization through stronger community integration:

> *'When the poor are empowered, the isolation of the individual is replaced by integration with the community. This relatedness with the other and with the inner self creates a sense of freedom and opens the space for autonomous initiatives by the poor. Integral to this sense of freedom is the ability through community action to acquire better access over input and output markets, credit, training and government institutions for security and justice. Empowerment of the poor signifies relatedness, and acquiring the confidence and material basis for taking autonomous initiatives for development'* (Hussain and Hussain 2006, p.10).

Increasing the resilience and empowering communities calls for a change in their economic, ecological, behavioral and social conditions. The participatory development paradigm of CBA as proposed by Ostrom's analysis of the 'third sector' and what Banuri (2002) calls 'civic entrepreneurship' enables communities at the village level to build their human, natural and economic capital based on group identity, skills and natural resource management. Through social mobilization, dialogues within communities should be initiated building on local informal institutions which lead to the formation of community organizations that can then collectively undertake various income generation, environmental conservation and infrastructure development projects. Attainment of new skills and vigorous participation allows communities to exert new control and influence over the socio-economic and ecological forces that impact their lives.

While the Asian Development Bank (ADB)'s Community-Based Forestry Sector Project, which began in 1995, received mixed reviews, the idea of pro-poor and participatory VDCs and VOs, with support from the traditional structures like *'jirga'* needs to be revitalized. The key to a sound community based climate

change adaptation strategy is strengthening of local and traditional institutions and defining their functions which include information gathering and its dissemination, resource allocation and mobilization, capacity building, applications of modern technology (telecommunications and alternative energy), leadership and social networking with other institutions. This enhances the capacity to manage climate-sensitive assets and natural resources and increases the resilience of communities (World Bank 2009; Agrawal 2008).

For example, local knowledge and capacities exist in Shigar and Keti Bunder (Pakistan) and should be used to complement more centralized and 'expert' planning. If vulnerability to change induced by variations in climate and the sustainability and improvement of the livelihoods of poor people are to be achieved, there needs to be an understanding of how the poor and vulnerable sustain their livelihoods. In addition to this, a knowledge base needs to be created on the role of CBA in livelihood activities and the scope for adaptation actions that reduce vulnerabilities and increase the resilience of poor people.

3. The Right Set of Incentives and Costs for Communities

According to Chishakwe et al. (2012), incentives that motivate communities to act in a particular manner (e.g. conserve and promote mangrove regeneration) are not necessarily financial or quantifiable. It is usually when the 'value' of an incentive measure is associated with a particular community need that people weigh the benefits of conserving the resource against the costs incurred. For CBA projects, incentives are critical to motivate communities to implement adaptation actions. However, because the benefits of adaptation are only realised in the long term, the specific nature of incentive measures required to motivate communities in the short-term becomes particularly important.

Also, communities do not necessarily act on the basis of monetary incentives alone.[12] They may be motivated by what they perceive to be of 'value' to them. This confirms an argument that has been advanced in relation to incentives for CBA that: ***'local people often measure the inputs and outcomes of an adaptation programme in ways that reflect the local systems of valuing goods, services and well-being'*** (IIED and CLACC 2010). When determining the appropriate nature of incentives for a CBA project at conceptualisation stage, it is therefore imperative to make such assessments from a broad viewpoint taking into account 'local value systems' (Chishakwe et al. 2012).

In order to successfully implement a community-led project whose benefits are only realised in the long term, it is important to have interim (incentive) mechanisms that compensate for any short term (opportunity) costs such as offering wage labour to the community to off-set income loss. If not addressed, these costs are likely to affect the implementation of CBA projects.

4. A Cooperative Regional Environment

Adaptation to climate change in South Asia, is undoubtedly, challenging (Sharma et al. 2009) and requires not just national responses, but also collective ones:

> *'Partnerships and coordinated approaches provide a cost-effective way of adapting to the impending regional climate related risks'* (World Bank 2009a, p.5).

Pakistan's rural areas the 'jirga' or 'panchayat' often play critical roles

The Bali Action Plan 2009, as well as the subsequent Copenhagen Accord at COP-15 in December 2009 called for urgent *'enhanced action and international cooperation on adaptation'* (UNFCCC 2010, p.6) and that the developed countries should provide

> *'.....adequate, predictable and sustainable financial resources, technology and capacity-building to support the implementation of adaptation action in developing countries'* (UNFCCC 2010, p.6).

For sustainable and climate-resilient development in South Asia, adaptation measures should, therefore focus on the poor; investment in knowledge sharing; regional (as well as international) cooperation; institutional and technical capacity building; and protecting environmental services (World Bank 2009a, M.E.A 2005). The adoption of the Thimphu Statement on Climate Change by the South Asian Association for Regional Cooperation (SAARC) countries in Bhutan in April 2010 was a step in the right direction. The member countries agreed to commission regional studies to understand climate risks; encourage the use of green technology; share best practices for low-carbon inclusive programmes including initiating a regional afforestation/reforestation campaign to plant ten million trees from 2010-2015; as well as commission initiatives on the role of glaciers, evolving monsoon patterns in sustainable livelihoods; and integration of climate change adaptation with disaster risk reduction. The countries also agreed to

> *'.....establish an Inter-governmental Expert Group on Climate Change to develop clear policy direction and guidance for regional cooperation as envisaged in the SAARC Plan of Action on Climate Change..... establish institutional linkages among national institutions in the region to, among others, facilitate sharing of knowledge, information and capacity building programs in climate change related areas'* (SAARC 2010).

Unfortunately, however, there has been no conscious effort to harmonise CBA as a concept at the regional level. This is probably because CBA is still in its infancy. Most of its elements, approaches and frameworks remain untested. It is, therefore, critical that as a community-led initiative, it first goes through the process of validation through practice. Indeed, it is through practice that its benefits to communities can be verified, appreciated and adopted as a regional model for the benefit of communities in the region.

Conclusion

Adaptation to climatic variation has occurred for centuries but anthropogenic climate change poses a challenge of greater magnitude than ever known before (IPCC 2007a). Adaptive responses take place through adjustments in physical, ecological and human systems to reduce vulnerability or enhance resilience in response to expected changes. Resilience can be defined as *'the capacity of linked social-ecological systems to absorb recurrent disturbances such as hurricanes and floods so as to retain essential structures, processes and feedbacks'* (Adjer et al. 2005). This adaptive capacity is unevenly distributed, and those who are poor and marginalized are most at risk, often being the most dependent on natural resources for their livelihoods. In response to environmental risks, the common community-based adaptation responses are mobility, storage, diversification, communal pooling and exchange (Agrawal 2008). The effectiveness of these adaptive strategies depends on the nature of institution and environmental threat, culture of the community, geographic location, economic and social factors (Ostrom 1990; Jütting 2003; Agrawal 2008). Vulnerability is also exacerbated by human induced change to these systems, and climate change is projected to compound the existing pressures on natural resources and environment (IPCC 2007).

A key to a sound climate change adaptation strategy lies in strengthening local institutions and community based adaptation initiatives and defining their functions which include information gathering and its dissemination, resource allocation and mobilization, capacity building, applications of modern technology (telecommunications and alternative energy), leadership and social networking. This enhances capacity to manage climate-sensitive assets, natural resources and increases the resilience of communities (World Bank 2009; Agrawal 2008).

Based on lessons from global CBA projects and initiatives, it becomes clear that foreign organizations (which include NGOs and INGOs) need to win community trust first and foremost; have first-hand knowledge about indigenous community capacities and past/present coping practices before introducing new technologies, ideas or practices; when it comes to 'gender sensitive' CBA activities, women, marginalized and even children's roles need to be recognized and seen as potential change agents for building community resilience against climate vulnerability; and finally that adaptation initiatives (whether local, regional or national) are about learning-by-doing.

The impact of climate change is diverse and its effects vary in different ecosystems. Consequently, there can be no one-size-fits-all approach while formulating climate risk management strategy (Agrawal 2008). The proposed strategy needs to fit local risks and conditions. At the institutional level, local governments play a critical role in the development and implementation of policies and measures to address climate change. However, not only do issues of expertise and awareness loom large, but as our cases illustrate, actions by government and formal institutions are often either contradictory and outright inequitable and unjust towards the marginalized communities. Approaches that emphasize a bottom-up approach and that recognize rural coping strategies and indigenous knowledge must be understood and documented, since these will add to local adaptive capacities.

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